

Assessment of Awareness of Antimicrobial Drugs among residents in a Semi-Urban Community in Rivers State

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ABSTRACT

Antimicrobial agents are widely used chemotherapeutic drugs for the treatment of various infectious diseases; however, they are sometimes misused, contributing to antimicrobial resistance. This study evaluated the knowledge and practices related to antimicrobial use among residents of Abonnema in Akuku-Toru Local Government Area of Rivers State, Nigeria. A descriptive cross-sectional study design was adopted. A sample size of 252 respondents was selected, and data were collected using a semi-structured questionnaire. Data were analyzed using frequencies, percentages, and Chi-square statistics. The findings revealed that the majority of respondents (95%) had an adequate level of knowledge regarding antimicrobial agents. Vomiting was the most commonly reported side effect following antimicrobial use, while 4.4% reported fever, 2.0% reported cough, 1.2% experienced drowsiness, and 17.5% reported other side effects. Regarding commonly used antimicrobials, 1.6% reported using Flagyl, 0.8% Septrin, 0.4% Fluconazole, 0.4% Albendazole, 0.8% Tetracycline, 0.8% Clotrimazole, 0.8% ACT, and 3.2% reported using other antimicrobials, while 91.0% had taken more than one antimicrobial combination. In terms of practice, 35.3% of respondents obtained antimicrobials from medicine shops, and 66.3% complied with prescription instructions. The study concluded that residents demonstrated good knowledge of antimicrobial use and awareness of associated resistance. However, public enlightenment programs on the rational use of antimicrobials are recommended. Furthermore, effective laboratory investigations should be encouraged prior to the prescription and administration of antimicrobial agents to promote appropriate use in order to reduce antimicrobial resistance.

Keywords: Medicine Shops, Antimicrobial Agents, Antimicrobial Resistance, Knowledge, Prescription, Tetracycline.

Introduction

Antimicrobial drugs have revolutionized modern medicine and remain indispensable in the treatment and prevention of infectious diseases. However, their effectiveness is increasingly threatened by the growing burden of antimicrobial resistance (AMR), a global public health challenge largely driven by the inappropriate use and misuse of these agents. The World Health Organization - WHO (2023) identifies AMR as one of the top ten global public health threats facing humanity, emphasizing that misuse and overuse of antimicrobials in humans, animals, and agriculture accelerate the emergence of resistant pathogens.

Although considerable attention has been directed toward improving access to antimicrobials in low- and middle-income countries, less emphasis has been placed on understanding how these drugs are used at the community level and the extent of public awareness regarding their appropriate use and associated risks (Auta et al., 2019; WHO, 2023).

Antimicrobials are often perceived as “miracle drugs” capable of curing a wide range of illnesses, including viral infections for which they are ineffective. This misconception contributes to self-medication, incomplete dosage regimens, overuse of broad-spectrum antibiotics, and the sharing of medications among family members.

According to the Centers for Disease Control and Prevention (2022), inappropriate antimicrobial use remains a primary driver of resistance globally. Similarly, the World Bank (2017) warns that unchecked AMR could result in significant economic losses and increased healthcare expenditure, particularly in developing nations. The consequences of AMR extend beyond treatment failure to include prolonged hospital stays, increased healthcare costs, and elevated morbidity and mortality rates (Dadgostar, 2019; Murray et al., 2022).

Recent global estimates indicate that bacterial AMR was directly responsible for approximately 1.27 million deaths worldwide in 2019 and associated with nearly 5 million deaths (Murray et al., 2022). In many low- and middle-income countries, antimicrobial misuse is influenced by weak regulatory enforcement, inadequate diagnostic facilities, limited public health education, socioeconomic constraints, and reliance on informal drug vendors (O'Neill, 2016; WHO, 2023). Rural and semi-urban communities are particularly vulnerable due to reduced access to structured healthcare systems and sustained awareness campaigns. Limited health literacy often results in poor understanding of dosage, duration, and adherence requirements, thereby fostering irrational antimicrobial practices.

In Nigeria, antimicrobial drugs are widely accessible, and in many communities, they can be obtained without prescription despite existing regulatory frameworks. Studies conducted in various parts of the country report high levels of self-medication and non-prescription antibiotic use (Auta et al., 2019; Ocan et al., 2015). While national action plans aligned with the Global Action Plan on AMR have been developed, implementation at the grassroots level remains inconsistent. Semi-urban communities, especially those with limited diagnostic infrastructure, frequently rely on empirical treatment approaches. Although empirical therapy is sometimes necessary, repeated prescribing without laboratory confirmation may contribute to inappropriate drug selection and overuse of broad-spectrum agents. Furthermore, socioeconomic pressures may encourage residents to seek cheaper alternatives such as patent medicine vendors or informal drug hawkers, increasing the likelihood of misuse.

Despite the recognized importance of community awareness in combating AMR, there is limited empirical evidence on the level of awareness of antimicrobial drugs among residents of semi-urban communities in Rivers State, Nigeria.

Abonnema, located in Akuku-Toru Local Government Area of Rivers State, represents a typical semi-urban setting characterized by mixed access to formal healthcare services and informal medicine distribution channels. However, documented data on residents' awareness of antimicrobial drugs, understanding of appropriate usage, and knowledge of antimicrobial resistance remain scarce.

Community awareness is a critical component of antimicrobial stewardship. The World Health Organization Global Action Plan on Antimicrobial Resistance emphasizes improving awareness and understanding of AMR through effective communication, education, and training as a strategic objective (WHO, 2015; WHO, 2023 update). Effective stewardship extends beyond healthcare facilities and requires informed participation of the public.

Understanding the level of awareness of antimicrobial drugs among residents in semi-urban communities is therefore essential for identifying knowledge gaps, misconceptions, and behavioral patterns that may contribute to misuse. Such evidence is necessary for designing targeted health education programs, strengthening regulatory oversight, and supporting sustainable interventions aligned with national and global AMR containment strategies.

Against this backdrop, this study assesses the awareness of antimicrobial drugs among residents in Abonnema - a semi-urban community in Rivers State, Nigeria.

By examining the level of knowledge and factors influencing antimicrobial use within this community, the study seeks to generate context-specific evidence that can inform public health interventions aimed at promoting responsible antimicrobial use and mitigating the threat of antimicrobial resistance at the grassroots level.

Materials and Methods

Study Design

A community-based cross-sectional descriptive study design was adopted to assess awareness and use of antimicrobial drugs among residents of Abonnema community in Rivers State, Nigeria. A cross-sectional design enables the collection and analysis of data from a defined population at a single point in time without manipulation of variables, making it suitable for assessing knowledge, practices, and associated factors within a community setting (Setia, 2016).

Study Area

The study was conducted in Abonnema, the administrative headquarters of Akuku-Toru Local Government Area (LGA) in Rivers State, Nigeria. Rivers State is located in the Niger Delta region of the South-South geopolitical zone. Abonnema is a predominantly riverine, semi-urban community situated along the Bonny River and largely inhabited by the Ijaw ethnic group. Fishing, petty trading, and small-scale businesses constitute major socioeconomic activities in the area. The presence of both formal healthcare facilities and informal medicine vendors makes the community appropriate for assessing antimicrobial awareness and usage patterns.

Study Population and Sample Size Determination

The study population comprised adult male and female residents of Abonnema community aged 18 years and above. According to the 2006 National Population Census, Abonnema has an estimated population of approximately 15,000 residents. Eligible participants included residents aged 18 years and above who had previously used antimicrobial drugs and provided informed consent. Individuals below 18 years of age, non-residents, those who had never used antimicrobial drugs, and individuals who declined participation were excluded from the study.

The sample size was determined using the Taro Yamane formula for finite populations:

$$n = \frac{N}{1+N(e)^2}$$

Where:

- n = required sample size
- N = population size (15,000)
- e = margin of error (0.06).

The calculation yielded a sample size of 252 respondents. The Taro Yamane formula is widely used in social and public health research to determine sample size for finite populations at a specified level of precision (Yamane, 1967).

Sampling Technique

A stratified random sampling technique was used to ensure representativeness. The community was first stratified by key demographic characteristics (e.g., gender and residential zones). Subsequently, simple random sampling was applied within each stratum to select eligible participants. Identification numbers were assigned, and respondents were selected using a random selection method to minimize selection bias.

Instrument for Data Collection

Data were collected using a self-structured questionnaire titled “*Awareness and Use of Antimicrobial Drugs Questionnaire*.” The instrument consisted of closed-ended questions designed to elicit specific responses aligned with the objectives of the study.

The questionnaire comprised four sections:

- **Section A:** Demographic characteristics of respondents (4 items).
- **Section B:** Items assessing awareness, knowledge, and use of antimicrobial drugs and antimicrobial resistance (19 items).
- **Section C:** Factors contributing to misuse and overuse of antimicrobial drugs (5 items).
- **Section D:** Strategies for preventing antimicrobial misuse and promoting responsible use (10 items).

Closed-ended questions were used to facilitate clarity, ease of response, and uniformity in data analysis.

Validity of the Instrument

Validity refers to the extent to which an instrument measures what it is intended to measure (Patino & Ferreira, 2018). The questionnaire was subjected to face and content validation by experts in public health and the research supervisor. Corrections and modifications were made based on their feedback to ensure clarity, relevance, and alignment with the study objectives before final administration.

Reliability of the Instrument

Reliability refers to the degree of consistency and stability of a measuring instrument. A pilot study was conducted using 10% of the sample size in a similar population within the community. Data obtained were analyzed using the Pearson Product Moment Correlation coefficient, which yielded a reliability coefficient of 0.91, indicating a high level of internal consistency. The instrument was therefore considered reliable for the study.

Pilot Testing

Pre-testing of the questionnaire was carried out among 10 adult residents using an accidental sampling technique. The pilot test helped identify ambiguities and ensured clarity of the questions before full-scale data collection.

Data Collection Procedure

Ethical approval and community permission were obtained prior to data collection. Questionnaires were administered to respondents with the assistance of a trained research assistant. Respondents were given adequate time to complete the questionnaire, and completed copies were retrieved immediately to ensure a high response rate and completeness of data. Data collection was conducted over a three-day period.

Data Analysis

Completed questionnaires were checked for completeness and coded appropriately. Data were analyzed using descriptive statistics, including frequencies, percentages, and Tables. Inferential statistics, specifically the Chi-square test, were used to test the stated hypotheses at a 0.05 level of significance.

Ethical Considerations

Ethical principles were strictly observed throughout the study. Participants were informed about the purpose and nature of the study and assured of confidentiality, anonymity, and voluntary participation. Written informed consent was obtained before questionnaire administration. Participants were informed of their right to withdraw at any stage without penalty. Permission to conduct the study was obtained from the Paramount Ruler of Abonnema community and the Akuku-Toru Local Government Authority. Approval letters were secured prior to commencement of data collection. All collected data were handled confidentially and used strictly for research purposes.

Results

The distribution of sociodemographic characteristics of participants is presented in Table 1.

Table 1: Percentage Distribution of Sociodemographic Characteristics of Participants (N = 252)

Variable	Category	Frequency (n)	Percentage (%)
Age (Years)	18–30	116	46.0
	31–50	82	32.5
	51–70	44	17.5
	≥71	10	4.0
Gender	Male	120	47.6
	Female	132	52.4
Educational Level	Primary	32	12.7
	Secondary	155	61.5
	Tertiary	65	25.8
Occupational Status	Business	112	44.4
	Employed	34	13.5
	Unemployed	52	20.6
	Students	46	18.3
	Retirees	8	3.2
Total		252	100

The age distribution shows that the majority of respondents (46.0%) were between 18–30 years, followed by 31–50 years (32.5%), indicating that a substantial proportion of the participants were young and economically active adults. Only 4.0% were aged 71 years and above. In terms of gender, females (52.4%) slightly outnumbered males (47.6%), suggesting balanced gender representation in the study. Regarding educational level, most respondents (61.5%) had secondary education, while 25.8% had tertiary education. Only 12.7% had primary education. Occupationally, business activities were the dominant source of livelihood (44.4%), reflecting the informal economic structure of the community. Unemployed respondents constituted 20.6%, while students accounted for 18.3%. Only 13.5% were formally employed, and retirees made up a small proportion (3.2%).

The results of distribution of responses on awareness and use of antimicrobial drugs are as shown in Table 2.

The findings indicate a high level of awareness of antimicrobial drugs (95.2%) among respondents. A majority (87.3%) had heard of antimicrobial resistance, and nearly all participants (98.4%) demonstrated knowledge of its causes and acknowledged that misuse contributes to resistance. Despite high awareness, 24.2% reported having taken antibiotics without prescription, and 35.3% believed antibiotics could be purchased without prescription. Pharmacists (35.3%) and multiple prescribers (24.6%) were the most common sources of antimicrobial prescriptions, while 13.1% practiced self-prescription. Most respondents reported good adherence practices, with 66.3% always completing prescribed antibiotics and 97.2% following dosage instructions. However, gaps remain, as forgetfulness (34.9%) and lack of proper education by prescribers (44.4%) were key reasons for non-adherence. A large proportion (91.3%) had taken more than one type of antimicrobial drug. Sharing antibiotics was relatively low (5.6%). Regarding perception, 46.0% rated awareness in the community as very high, while 43.7% rated it high.

Table 2: Distribution of Responses on Awareness and Use of Antimicrobial Drugs (N = 252)

Item	Response	Frequency (n)	Percentage (%)
Awareness of antimicrobial drugs	Yes	240	95.2
	No	12	4.8
Belief that antibiotics can be bought without prescription	Yes	89	35.3
	No	163	64.7
Ever taken antibiotics without prescription	Yes	61	24.2
	No	191	75.8
You or someone you know ever taken antibiotics without prescription	Yes	62	24.6
	No	190	75.4
Who prescribed the antimicrobial	Doctor	42	16.7
	Nurse	18	7.1
	Pharmacist	89	35.3
	Medicine shop	8	3.2
	Self	33	13.1
	More than one person	62	24.6
Condition of antimicrobial use	When ill only	96	38.1
	Regularly	4	1.6
	Occasionally	103	40.9
	Never took before	49	19.4
Adherence to prescribed antibiotics	Always	167	66.3

Item	Response	Frequency (n)	Percentage (%)
	Sometimes	52	20.6
	Rarely	20	7.9
	Never	13	5.2
Necessity to complete antibiotic course	Yes	240	95.2
	No	12	4.8
Following dosage instructions	Yes	245	97.2
	No	7	2.8
Reasons for not following prescription	Lack of funds	52	20.6
	Forgetfulness	88	34.9
	Not educated by prescriber	112	44.4
Antimicrobials taken	Metronidazole (Flagyl)	4	1.6
	Septin	2	0.8
	Fluconazole	1	0.4
	Tetracycline	2	0.8
	Clotrimazole	2	0.8
	ACT	2	0.8
	Others	8	3.2
	More than one	230	91.3
Sharing antibiotics with family/friends	Yes	14	5.6
	No	238	94.4
Heard of antimicrobial resistance	Yes	220	87.3
	No	32	12.7
Knowledge of what causes antimicrobial resistance	Yes	248	98.4
	No	4	1.6
Aware misuse contributes to resistance	Yes	248	98.4
	No	4	1.6
Perception of adequacy of knowledge in Abonnema	Yes	248	98.4
	No	4	1.6
Rating of current knowledge/awareness	Very low	2	0.7
	Low	4	1.9
	Moderate	20	7.9
	High	110	43.7
	Very high	116	46.0
Perceived public health implications	Increased AMR	120	47.6
	Spread of drug-resistant infections	80	31.7
	Reduced effectiveness of antibiotics	52	20.6
Belief that public health system is equipped	Yes	120	47.6
	No	132	52.4

Table 3 shows respondents' knowledge and use of antimicrobial drugs. It indicates a high level of awareness of antimicrobial drugs among respondents, with 95.2% aware of antimicrobials and 87.3% having heard of antimicrobial resistance (AMR). Additionally, 98.4% understood that misuse contributes to resistance.

Despite this strong awareness, misuse persists. About 35.3% believe antibiotics can be obtained without prescription, and 24.2% admitted to self-medication. Antimicrobials were obtained mainly from pharmacists (35.3%), doctors (16.7%), and through self-medication (13.1%), with 24.6% receiving prescriptions from multiple sources.

Most respondents reported responsible practices: 66.3% always adhered to prescriptions, 97.2% followed dosage instructions, and 95.2% acknowledged the need to complete the full course. However, non-adherence was linked to inadequate prescriber education (44.4%), forgetfulness (34.9%), and financial constraints (20.6%).

Although 91.3% had used more than one antimicrobial, 94.4% did not share antibiotics. The majority rated their knowledge as high or very high (89.7% combined). While respondents recognized key public health implications of AMR, over half (52.4%) believed the health system is not adequately equipped to address the problem.

Table 3: Percentage Responses of Respondents' Knowledge and Use of Antimicrobial Drugs (N = 252)

Item	Response	Frequency (n)	Percentage (%)
Awareness of antimicrobial drugs	Yes	240	95.2
	No	12	4.8
Belief that antibiotics can be bought without prescription	Yes	89	35.3
	No	163	64.7
Ever taken antibiotics without prescription	Yes	61	24.2
	No	191	75.8
You or someone you know ever taken antibiotics without prescription	Yes	62	24.6
	No	190	75.4
Who prescribed the antimicrobial	Doctor	42	16.7
	Nurse	18	7.1
	Pharmacist	89	35.3
	Medicine shop	8	3.2
	Self	33	13.1
	More than one person	62	24.6
Condition of antimicrobial use	When ill only	96	38.1
	Regularly	4	1.6
	Occasionally	103	40.9
	Never took before	49	19.4
Adherence to prescribed antibiotics	Always	167	66.3
	Sometimes	52	20.6
	Rarely	20	7.9
	Never	13	5.2

Item	Response	Frequency (n)	Percentage (%)
Perception of necessity to complete antibiotics course	Yes	240	95.2
	No	12	4.8
Following dosage instructions	Yes	245	97.2
	No	7	2.8
Reasons for not following prescription	Lack of funds	52	20.6
	Forgetfulness	88	34.9
	Not educated by prescriber	112	44.4
Antimicrobials taken	Metronidazole (Flagyl)	4	1.6
	Septrin	2	0.8
	Fluconazole	1	0.4
	Tetracycline	2	0.8
	Clotrimazole	2	0.8
	ACT	2	0.8
	Others	8	3.2
	More than one	230	91.3
Sharing antibiotics with family/friends	Yes	14	5.6
	No	238	94.4
Heard of antimicrobial resistance	Yes	220	87.3
	No	32	12.7
Knowledge of what causes antimicrobial resistance	Yes	248	98.4
	No	4	1.6
Aware misuse contributes to resistance	Yes	248	98.4
	No	4	1.6
Perception of adequacy of knowledge in Abonnema	Yes	248	98.4
	No	4	1.6
Rating current knowledge/awareness	Very low	2	0.7
	Low	4	1.9
	Moderate	20	7.9
	High	110	43.7
	Very high	116	46.0
Perceived public health implications	Increased antimicrobial resistance	120	47.6
	Spread of drug-resistant infections	80	31.7
	Reduced effectiveness of antibiotics	52	20.6
Belief that public health system is equipped	Yes	120	47.6
	No	132	52.4

The responses on factors contributing to the misuse of antimicrobial drugs are presented in Table 4. The results showed that 23.0% of respondents had used antimicrobial drugs without a prescription (self or someone known). The major reasons for self-medication were saving time by avoiding a doctor's visit (52.4%) and saving money on consultation fees (31.7%). Fewer respondents cited previous experience with the same illness (7.9%), belief that a prescription was unnecessary (5.9%), difficulty accessing healthcare services (1.9%), or recommendations from family and friends (1.2%).

Regarding broader community factors, socioeconomic factors (78.2%) were overwhelmingly identified as the main contributor to misuse and overuse. Other factors such as limited healthcare infrastructure (7.9%), lack of awareness (4.0%), pressure from friends or family (4.0%), and the belief that antimicrobials can treat any illness (4.0%) were less commonly reported. Despite these misuse factors, awareness remains relatively high: 88.1% were aware of the potential consequences of antimicrobial resistance, and 93.3% perceived antimicrobial resistance as a significant concern.

Table 4: Percentage Responses on Factors Contributing to the Misuse of Antimicrobial Drugs (N = 252)

Item	Response	Frequency (n)	Percentage (%)
Ever used antimicrobial drugs without a prescription (self or someone known)	Yes	58	23.0
	No	194	77.0
Reasons for using antimicrobial drugs without a prescription	Save time by avoiding a doctor's visit	132	52.4
	To save money on consultation fees	80	31.7
	Previous experience with the same illness	20	7.9
	Recommendation from family or friends	3	1.2
	Belief that a prescription was unnecessary	15	5.9
	Difficulty accessing healthcare services	5	1.9
	To relieve symptoms quickly	–	–
Factors contributing to misuse and overuse in the community	Lack of access to healthcare facilities	5	2.0
	Lack of awareness about consequences of misuse	10	4.0
	Socioeconomic factors	197	78.2
	Pressure from friends or family	10	4.0
	Belief that antimicrobials can treat any illness	10	4.0
	Limited healthcare infrastructure	20	7.9
Awareness of potential consequences of antimicrobial resistance	Yes	222	88.1
	No	30	11.9
Perception of antimicrobial resistance as a significant concern	Yes	235	93.3
	No	17	6.7

The results on the strategies to improve awareness and promote responsible antimicrobial usage are shown in Table 5.

Table 5: Strategies to Improve Awareness and Promote Responsible Antimicrobial Usage (N = 252)

Item	Response	Frequency (n)	Percentage (%)
Exposure to educational campaigns on antimicrobial usage and resistance	Yes	200	79.4
	No	52	20.6
Strategies considered most effective in raising awareness	Educational campaigns	50	19.8
	Workshops and training sessions	40	15.9
	Community health outreach programs	30	11.9
	Engaging healthcare professionals	40	15.9
	Media campaigns (radio, TV, social media)	20	7.9
	School curriculum integration	35	13.9
	Involving local leaders/community influencers	30	11.9
	Public signage in healthcare facilities	7	2.8
Age groups to prioritize in awareness initiatives	Children	25	9.9
	Adolescents	24	9.5
	Adults	50	19.8
	Elderly	43	17.1
	Healthcare providers	10	4.0
	All age groups	100	39.7
Community receptiveness to awareness initiatives	Yes	230	91.3
	No	22	8.7
Perception of AMR as a significant public health concern	Yes	200	79.4
	No	52	20.6
Sources of health and medication information	Healthcare professionals	100	39.7
	Family and friends	80	31.7
	Social media	20	7.9
	Television or radio	10	4.0
	Internet	5	2.0
	Local government sources (Town crier)	37	14.7
Exposure to information on antimicrobial resistance	Yes	241	95.6
	No	11	4.4

A large proportion of respondents (79.4%) reported exposure to educational campaigns on antimicrobial use and resistance, and 95.6% had been exposed to information about antimicrobial resistance. Additionally, 91.3% indicated that the community is receptive to awareness initiatives, suggesting strong potential for successful interventions. In terms of effective strategies, educational campaigns (19.8%), engaging healthcare professionals (15.9%), and workshops/training sessions (15.9%) were most frequently identified. School curriculum integration (13.9%), community outreach (11.9%), and involvement of local leaders (11.9%) were also considered important, while public signage (2.8%) was least preferred. Regarding priority groups, 39.7% recommended targeting all age groups, while others emphasized adults (19.8%) and the elderly (17.1%). This reflects the perception that antimicrobial misuse is a community-wide issue. Healthcare professionals (39.7%) were the main source of health and medication information, followed by family and friends (31.7%) and local government sources (14.7%). Media and internet sources played smaller roles. The one-sample t-test comparing the mean knowledge score against a predetermined threshold for adequate knowledge are presented in Table 6. There is no significant difference between the mean knowledge score of antimicrobial drugs among residents of Abonnema LGA and the predetermined threshold for adequate knowledge.

Table 6: One-sample t-test (comparing the mean knowledge score against a predetermined threshold for adequate knowledge)

Statistic	Value
Mean knowledge score	4.5
Predetermined threshold	3.5
t-value	8.32
Df	251
Sig. (2-tailed)	0.000

The results of the Chi-Square test of independence are presented in Table 7. The one-sample t-test results indicate that the mean knowledge score of antimicrobial drugs among residents of Abonnema LGA is 4.5, which is higher than the predetermined threshold of 3.5 for adequate knowledge.

The calculated t-value of 8.32 with 251 degrees of freedom is statistically significant at $p = 0.000$ (2-tailed). This implies that the knowledge level of residents regarding antimicrobial drugs is significantly above the minimum adequate threshold, indicating a generally satisfactory awareness and understanding of antimicrobial usage in the community. There is no significant relationship between the identified factors (socioeconomic status, accessibility/over-the-counter availability, health literacy, prescribing practices, and use of traditional medicines) and the misuse of antimicrobial drugs among residents of Abonnema LGA.

Table 7: Chi-Square test of independence.

Factor	χ^2	df	Sig.
Socioeconomic status	12.34	4	0.015
Accessibility / OTC availability	18.56	4	0.002
Health literacy	22.45	4	0.000
Prescribing practices	10.67	3	0.030
Use of traditional medicines	8.91	3	0.031

The results of the Chi-Square test of independence are presented in Table 8.

Table 8: Chi-Square test of independence

Strategy	χ^2	df	Sig.
Community sensitization	15.23	3	0.002
Provider training	12.87	3	0.005
Regulation enforcement	9.65	2	0.008

The Chi-Square test of independence shows that all the identified factors; socioeconomic status ($\chi^2 = 12.34$, $p = 0.015$), accessibility/over-the-counter availability ($\chi^2 = 18.56$, $p = 0.002$), health literacy ($\chi^2 = 22.45$, $p = 0.000$), prescribing practices ($\chi^2 = 10.67$, $p = 0.030$), and use of traditional medicines ($\chi^2 = 8.91$, $p = 0.031$) have statistically significant relationships with the misuse of antimicrobial drugs among residents of Abonnema LGA. This indicates that these factors significantly influence or contribute to inappropriate antimicrobial usage, suggesting that interventions targeting these determinants could help reduce misuse within the community.

There is no significant association between the implementation of awareness/educational strategies (Community sensitization, provider training, regulation enforcement) and the level of responsible antimicrobial usage among residents of Abonnema LGA.

The Chi-Square test of independence shown in Table 9 indicates that all the examined awareness and educational strategies; community sensitization ($\chi^2 = 15.23$, $p = 0.002$), provider training ($\chi^2 = 12.87$, $p = 0.005$), and regulation enforcement ($\chi^2 = 9.65$, $p = 0.008$) are significantly associated with the level of responsible antimicrobial usage among residents of Abonnema LGA.

This suggests that the implementation of these strategies effectively promotes appropriate antimicrobial practices, highlighting the importance of continued educational and regulatory interventions to improve responsible drug use in the community.

Table 9: Chi-Square Correlation (Knowledge vs Resistance)

Variable	Knowledge of Antimicrobial Usage	Resistance
Knowledge of Antimicrobial Usage	1	0.221**
Sig. (2-tailed)	—	0.000
N	252	252
Resistance	0.221**	1
Sig. (2-tailed)	0.000	—
N	252	252

Pearson correlation analysis (Table 10) revealed a weak but statistically significant positive relationship between knowledge of antimicrobial use and antimicrobial resistance ($r = 0.221$, $p < 0.01$).

This suggests that higher knowledge levels are associated with better understanding and practices that may help reduce antimicrobial resistance.

The finding highlights the importance of educational interventions to promote responsible antimicrobial use in the community.

Table 10: Pearson Correlation

Variable	Knowledge of Antimicrobial Usage	Antimicrobial Resistance
Knowledge of Antimicrobial Usage	1	0.221**
Antimicrobial Resistance	0.221**	1
Sig. (2-tailed)	—	0.000
N	252	252

Discussion

This study revealed a high level of awareness and knowledge of antimicrobial drugs and antimicrobial resistance (AMR) among residents of Abonnema LGA. The majority of respondents was aware of antimicrobials and understood that misuse contributes to resistance, and the mean knowledge score was significantly above the predetermined adequacy threshold. This finding is consistent with reports from Nigeria by Okedo-Alex et al. (2019), who documented substantial knowledge of antimicrobial use and resistance among medical students. Although their study population differed, the similarity suggests a broader improvement in AMR awareness across Nigerian populations. Comparable findings were reported in Ethiopia by Simegn and Moges (2022), where most participants demonstrated adequate understanding of antimicrobial use and resistance. This trend aligns with global advocacy efforts led by the World Health Organization (2015) through the Global Action Plan on AMR, which emphasizes public awareness as a key strategic objective. Despite high awareness, inappropriate antimicrobial practices persist. A notable proportion of respondents reported self-medication and believed antibiotics could be obtained without prescription. This gap between knowledge and practice has been widely documented. For example, Simba et al. (2016) observed that awareness of antibiotics did not necessarily translate into appropriate use, as self-medication remained prevalent. These findings support behavioral health models suggesting that knowledge alone is insufficient to change practice when structural and socioeconomic determinants are influential.

Socioeconomic factors were identified as the strongest contributors to antimicrobial misuse in this study. Similar findings were reported by Awosan et al. (2019), who found that financial constraints and convenience often drive individuals to bypass formal healthcare consultations. In many low- and middle-income countries, high out-of-pocket healthcare costs and limited access to healthcare facilities encourage over-the-counter antibiotic purchases.

The significant association between accessibility and misuse in this study further reinforces concerns raised by the World Health Organization (2015) regarding weak regulatory enforcement and uncontrolled antimicrobial sales in developing regions.

Although adherence practices were generally satisfactory, barriers such as inadequate prescriber education, forgetfulness, and financial challenges were reported. Effective provider–patient communication has been shown to improve medication adherence. Lee et al. (2013) emphasized that clear counseling significantly enhances prudent antibiotic use and completion of prescribed courses.

Inadequate communication may therefore contribute to premature discontinuation and resistance development. The weak but statistically significant positive correlation between knowledge and antimicrobial resistance awareness indicates that higher knowledge modestly improves responsible antimicrobial practices.

However, the strength of the association suggests that knowledge must be complemented by structural and regulatory measures. This aligns with antimicrobial stewardship frameworks advocated by the World Health Organization (2015), which recommend integrated strategies combining education, surveillance, regulation, and professional accountability.

Furthermore, the significant association between awareness strategies (community sensitization, provider training, and regulatory enforcement) and responsible antimicrobial use underscores the importance of coordinated interventions. Bishop et al. (2018) highlighted the pivotal role of community pharmacists in antimicrobial stewardship, demonstrating that pharmacist-led interventions can significantly reduce inappropriate antibiotic use.

Conclusion

Residents of Abonnema LGA demonstrate high knowledge and awareness of antimicrobial drugs and antimicrobial resistance, with knowledge levels significantly exceeding the acceptable threshold. However, misuse remains prevalent and is significantly influenced by socioeconomic factors, accessibility of antibiotics without prescription, prescribing practices, and health literacy gaps. These findings indicate that knowledge alone is insufficient to eliminate inappropriate antimicrobial use. Effective control of antimicrobial resistance in the community therefore requires a comprehensive strategy combining sustained public education, strengthened regulatory enforcement, improved healthcare access, and enhanced antimicrobial stewardship practices.

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